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## Minimum unit pricing for alcohol: the most cost-effective of cancer prevention strategies?

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### 1. Introduction

Evidence that regular alcohol consumption plays a causal role in several types of cancer has accumulated for decades [1], though public awareness of this association is low in most countries (e.g. [2]). Alcohol industries profit hugely from this disconnect and sometimes even appropriate the respectable cause of cancer prevention in order to promote their carcinogenic product. A case in point was the launch of a pink-colored alcoholic soda in Canada to support a breast cancer awareness campaign [3]. Despite recognition of alcohol's carcinogenic properties for several decades by the World Health Organization (WHO) and international expert cancer bodies, astonishingly few countries even require warning labels to be placed on alcohol containers and alert consumers to the risk. The US National Cancer Institute reports that about \$5 billion is raised globally each year to 'fight cancer' [4]. I argue here that a highly cost-effective use of a fraction of those funds would be to enhance awareness of the alcohol-cancer link, with consumers and also with decision-makers who are in a position to introduce evidence-based prevention strategies such as minimum pricing for alcohol.

### 2. Alcohol's contribution to cancer is underestimated

International expert bodies such as the WHO's International Agency for Research on Cancer (IARC) are rightly conservative in their determinations as to when evidence is conclusive that a substance is carcinogenic. In 2010, an IARC report identified alcohol's causal contribution to several cancers of the digestive system (mouth, throat, larynx, esophagus, liver, colon, rectum) and also to cancer of the breast [5]. The World Cancer Research Fund International recently added stomach cancer to this list [6]. A recent report sponsored by the Swedish Society for Medicine estimated 14.5% of hospitalizations and 9.5% of deaths from these particular cancers in that country were attributable to alcohol consumption [7]. Bagnardi et al. [8] also identified 20 cancer sites in which published research indicates a positive association with alcohol use, including such prevalent cancers as prostate and melanoma.

It is also highly probable that the above estimates of the alcohol-cancer risk relationship are underestimated because of a widespread failure in epidemiological research to correct a bias commonly known as the 'sick quitter' effect, i.e. the tendency for people to quit or cut down their alcohol consumption when they are unwell. In a recent study of alcohol use and risk of prostate cancer, Zhao et al. [9] found that 75% of relevant studies suffered from this bias. After correction for abstainer bias, Zhao et al. [9] report that the estimated relative risk of prostate cancer from moderate alcohol use (<24 g ethanol/day) became three times higher. More studies are needed to explore the impact of abstainer bias on estimates of alcohol's contribution to the burden of disease internationally.

### 3. Lifetime exposure to alcohol as a major risk factor for cancer

Tobacco researchers have developed indicators for risk of lung cancer which measure total lifetime exposure to cigarette smoke using such measures as 'pack years', i.e. the equivalent number of years of smoking 20 cigarettes a day [10]. Some of the causal mechanisms whereby alcohol use creates risk of cancer are beginning to be understood, e.g. exposure of the digestive system to the toxic effects of acetaldehyde, the first metabolite from alcohol, and alcohol's contribution to the production of hormones associated with breast and prostate cancer risk [6]. Notwithstanding the well-documented challenges of measuring alcohol consumption based on self-report, it may well be time for epidemiologists to develop equivalent measures of lifetime exposure to alcohol, e.g. 'wine bottle' or '6 pack years' drawing upon studies with multiple measurement points across the life course. While special risks may yet be identified for heavy drinking episodes, it appears likely that the underlying cancer risk to an individual is the overall amount of alcohol their bodies have processed over their life. It follows that those concerned with reducing the population-wide incidence of cancers need also be concerned with the total per capita alcohol consumption of the population, usually expressed in liters of ethanol per person aged 15+ per year [11]. Any reduction in population-wide alcohol consumption will inevitably mean reduced cancer risk for many individuals.

#### 4. Minimum unit pricing (MUP): the most cost-effective strategy to reduce alcohol consumption

Multiple reviews have identified pricing strategies as being the most potent and evidence-based approach to reducing the population's consumption of alcohol [12] and hence exposure to its carcinogenic properties. A large literature spanning many countries and decades of data indicates that, all else being equal, a 10% increase in the price of alcohol results in about a 5% decrease in its consumption [13]. More recently, attention has been drawn to the importance of targeting cheap alcohol as a means of reducing rates of hazardous alcohol use. In most modern alcohol markets, consumers can choose upwards of 5000 products which vary by alcohol content, volume, beverage type, and price. However, it is those products which deliver the cheapest 'unit' or 'standard drink' of alcohol which are favored by the heaviest drinkers [14]. Furthermore, it has been demonstrated that the cheapest forms of alcohol are the most responsive (or 'elastic') when it comes to price increases – essentially, unless a drinker opts for nonbeverage alcohol or switches to illicit drugs, it is impossible for them to compensate for a price increase by finding cheaper products [15]. Studies of low-income alcohol-dependent drinkers indicate that the most common coping strategies when alcohol is unaffordable involve cutting down its consumption [16] rather than switching to more dangerous alternatives. The fact that policy case studies demonstrate that alcohol-caused deaths can be significantly reduced when the price of alcohol increases is also testament to the fact that the impact of these measures is not fully undermined by such compensatory strategies (e.g. [17]).

Canada is one of very few countries to have widely implemented minimum prices for alcohol sold for off-premise consumption [18]. Typically, this involves a provincial government determining the lowest price per liter that alcoholic beverages may be sold in a liquor store, thereby preventing alcohol being sold below these prices. Increasingly, these prices are being directly linked to the amount of pure alcohol in a particular beverage, i.e. becoming closer to the gold standard of a minimum price per 'unit' of alcohol or MUP.

A growing body of work has demonstrated that a 10% increase in average minimum prices in a Canadian province is associated with an 8% decrease in per capita alcohol consumption [19] and, of particular relevance here, a 9% decrease in rates of hospitalization for alcohol-related diseases, e.g. cancers [20].

It can thus be claimed with some justification that MUP is the most effective and efficient form of the most evidence-based strategy for reducing alcohol consumption (i.e. pricing). MUP has other significant virtues which enhance its attractiveness to policy-makers. First, it is highly cost-effective – it costs little to implement and, in for jurisdictions with government-led control systems (in North America, Scandinavia, and India), can also help governments increase revenues. Public opinion surveys suggest it is far more publicly acceptable than across the board price increases, principally because it targets heavier drinkers [21]. Despite intense opposition and legal action by some multinational companies to prevent the Scottish

government enacting its legislation to introduce MUP, many sectors of the alcohol industry stand to profit from the policy, simply because it restricts competition and protects profits. This is evidenced by industry groups supporting a government briefing document prepared by the Canadian Centre on Substance Use and Addiction advising provincial governments on how to regulate minimum alcohol prices in the interests of public health [18].

#### 5. The role of educational strategies to raise awareness of the alcohol–cancer connection

A narrow interpretation of the growing literature evaluating the effectiveness of alternative alcohol policies that aim to promote public health suggests only a limited role if any for educational strategies. Comprehensive and systematic reviews have repeatedly concluded that school-based and public awareness educational programs have little or no evidence of direct impact on population levels of alcohol consumption and related harm [12,22]. However, Giesbrecht [23] made a cogent case for reconceptualizing the purpose of educational strategies as a strategy for creating a more favorable climate of opinion for introducing more directly effective policies (e.g. pricing). Awareness campaigns about alcohol and cancer are a case in point where it is clear that both public awareness of the connection and public support for effective alcohol policies are low. Babor et al. [22] despairingly concluded that only ineffective policies (such as education) are popular. A more optimistic analysis is that raising awareness of the scientific evidence for alcohol's contribution to cancer might simultaneously increase support for effective alcohol policies [23]. Thus, raising awareness of the alcohol–cancer connection should be a major priority for cancer prevention in order to create a more favorable climate of opinion toward alcohol pricing policies.

#### 6. Conclusion

Sometimes, successful prevention strategies can be found in unexpected places. Cancer prevention and research is one of the most successful areas of health campaigning globally, in terms of public support and fund-raising. However, perhaps more effective in terms of real prevention than all the fun runs and high-profile campaigns would be the introduction of cost-effective strategies like MUP that nudge us all (and especially the heavy drinkers among us) to drink a little less.

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